

REMARKS**A. New Claims**

1. New claims 15- 20 have been added. New claims 15-18 claim subject matter previously present in original claims 7, 9 and 10. Applicants submit that support for claim 19 is present in Applicants disclosure at page 8 , ¶ 2 of the specification, and in Figures 4 and 10. Support for claim 20 can be found at page 8, ¶ 1 of the specification and in Figures 3-8.

It is believed that claim 19 is allowable because it depends directly from claim 1, which should be allowable for reasons discussed below. Claim 20 is believed to be allowable because it describes an invention wherein a plurality of partial flows are introduced into a tube where the tube defines a longitudinal axis, and a spiral motion, or vorticity, is imparted to each of the parallel partial flows when passing through the tube. See Specification at p. 8, ¶1. This spiral motion acts to enhance the heat transfer mechanism between the fluid flowing thorough the tube, and the tube walls. As an example not meant to restrict the scope of this claim, this spiral motion can be induced by, for example, the specific arrangement of the directing elements on the inside of the tube as disclosed by Applicants in Figure 4. It is felt that such a method is patentable over the references cited by the Examiner since it is not disclosed therein.

B. Claim Objections

1. Applicants thank the Examiner for his indication of allowable subject matter in claims 3-6. Applicants have rewritten dependent claim 3 in independent form. Applicants respectfully submit that no amendment is necessary to claims 4-6 since they all depend either directly or indirectly from claim 3. Applicants therefore respectfully request for this objection to be withdrawn.

C. Claim Rejections

Rejections Under 35 U.S.C. § 112

1. Claims 7, 9-10 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite because of the alleged use of a narrower range within a broader range in the same claim. Claims 7, 9-10 have been amended and new claims 15-16, 17, and 18 have been added to separately claim each aspect of the ranges formerly in claims 7, and 9-10. Applicants believe that these amendments should obviate the Examiner's rejection of claims 7 and 9-10. Applicants respectfully request for this ground of rejection to be withdrawn.

2. Claim 14 has been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite due to an alleged inconsistency between the language in the preamble and the body of the claim, making the scope of the claim unclear.

Applicants respectfully note that “[a] claim which makes reference to a preceding claim to define a limitation is an acceptable claim construction which should not necessarily be rejected as improper or confusing under 35 U.S.C. 112, second paragraph.” MPEP 2173.05(f), p. 2100-150. Applicants have drawn claim 14 to a “vehicle cooler” that comprises the elements of a tank and a heat exchanger, wherein the heat exchanger element comprises fluid conveying

tubes as recited in claim 1 and surface enlarging means arranged between the tubes. Applicants therefore respectfully submit that claim 14 is definite, and respectfully request that the rejection be withdrawn.

Rejections Under 35 U.S.C. § 102(b)

3. Claims 1-2, 8 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Bertrand et al., U.S. Patent No. 5,125,453. Specifically, the Examiner has stated that the angle γ is read as zero or 180 degrees in that reference. Applicants respectfully traverse the rejection.

Bertrand et al. cannot anticipate claims 1-2, 8 and 14 because it does not teach every element of those claims. See MPEP § 2131, p. 2100-54 (*quoting* Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631 (Fed. Cir. 1987) (“[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference”)). Applicants’ amended claim 1 recites that the elongate directing elements “succeeding in the longitudinal direction of the primary surfaces, are alternately arranged on the first and second primary surfaces and are mutually inclined at a given angle (γ)”. As an example of this arrangement, Applicants’ Figure 4 shows that succeeding directing elements in the longitudinal direction of the tube are ***alternately arranged***. This example is for means of illustration only and is not intended to affect the scope of the claims.

In contrast, Bertrand et al. discloses a plate for use in a plate-fin heat exchanger, including a plurality of beads arranged in rows. As illustrated in Figures 3 and 4 of that reference, the beads are not alternately arranged in the longitudinal direction of the plate. Since the beads in Bertrand are not alternately arranged in the longitudinal direction of the plate, they can not anticipate claim 1.

Since dependent claims 2, 8 and 14 all depend directly from claim 1, they also cannot be anticipated by these references. See MPEP § 2131, p. 2100-54. Applicants therefore respectfully request that the rejection under 35 U.S.C. 102(b) with respect to Bertrand et al. be withdrawn.

4. Claims 1-2, 8, 11-12 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Kamiya, Japanese Document No. 1-142393. Specifically, the Examiner has stated that the angle γ is read as zero or 180 degrees in that reference. Applicants respectfully traverse the rejection.

Kamiya cannot anticipate claims 1-2, 8, 11-12 and 14 because it does not teach every element of those claims. See MPEP § 2131, p. 2100-54 (*quoting* Verdegaa Bros. v. Union Oil Co. of California, 814 F.2d 628, 631 (Fed. Cir. 1987) (“[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference”)). As discussed above, Applicants’ amended claim 1 recites that the elongate directing elements “succeeding in the longitudinal direction of the primary surfaces, are alternatingly arranged on the first and second primary surfaces and are mutually inclined at a given angle (γ)”. As an example of this arrangement, Applicants’ Figure 4 shows that succeeding directing elements in the longitudinal direction of the tube are ***alternatingly arranged***. This example is for means of illustration only and is not intended to affect the scope of the claims.

In contrast, Kamiya discloses a tube of a heat exchanger having mutually opposing flat side surfaces 101, 102 containing two rows of a plurality of protuberance 2a, 2b projected inwardly at the inside surface of the tube 1 formed on the second flat side surface 102. Kamiya does not appear to disclose placing the protuberance on both sides 101, 102, let alone alternating them in the manner described by Applicants’ claim 1. Since the protuberance 2a, 2b

in Kamiya are not alternately arranged in the longitudinal direction of the tube, they can not anticipate claim 1.

Since dependent claims 2, 8, 11-12 and 14 all depend directly from claim 1, they also cannot be anticipated by these references. See MPEP § 2131, p. 2100-54. Applicants therefore respectfully request that the rejection under 35 U.S.C. 102(b) with respect to Kamiya be withdrawn.

5. Claims 1-2, 7-8, and 11-14 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Rhodes, U.S. Patent No. 4,470,452. Specifically, the Examiner has referred to Figure 7C in Rhodes. Applicants respectfully traverse the rejection.

Rhodes cannot anticipate claims 1-2, 7-8 and 11-14 because it does not teach every element of those claims. See MPEP § 2131, p. 2100-54 (*quoting* Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631 (Fed. Cir. 1987) (“[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference”)).

Applicants’ claim 1 recites that the elongate directing elements “succeeding in the longitudinal direction of the primary surfaces, are alternately arranged on the first and second primary surfaces and are mutually inclined at a given angle (γ)”. As an example of this arrangement, Applicants’ Figure 4 shows that succeeding directing elements in the longitudinal direction of the tube are ***alternately arranged***. This example is for means of illustration only and is not intended to affect the scope of the claims.

In contrast, the “herringbone construction” arrangement of the indentations in Fig. 7C of Rhodes is very different than that of Applicants’ disclosure. Clearly, the indentations in that Figure are not “mutually parallel”, i.e., in a row, as is required by claim 1; nor are they “mutually inclined at a given angle”. See Rhodes, at Col. 6, lines 41-43, Fig. 7C. Moreover,

none of the examples in Rhodes discloses indentations that are “alternatingly arranged” in the longitudinal direction of the tube as required by claim 1.

Since Rhodes does not disclose this feature of alternately arranging directing elements in the longitudinal direction of the tube, it cannot anticipate Applicants’ claim 1. Applicants, therefore, respectfully request for this ground of rejection to be withdrawn.

Rejections Under 35 U.S.C. § 103(a)

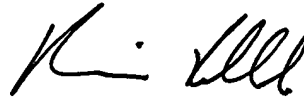
6. Claims 9-10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Bertrand et al., Kamiya, or Rhodes.

“To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art.” MPEP § 2143.03 (citing In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)). As discussed above, the references cited by the Examiner do not anticipate claim 1. Because claims 9-10 depend directly from claim 1, they also cannot be anticipated by the references cited by the Examiner, since they are narrower than claim 1. Since those claims cannot be anticipated by those references, it means that all of the elements of claims 9-10 are not disclosed in those claims. Since all the elements of claims 9-10 are not in those references, the combination of those references cannot render claims 9-10 obvious. Id. Therefore, Applicants respectfully request for this ground of rejection to be withdrawn.

Withdrawal of the rejections and reconsideration of the claims are respectfully requested.

Respectfully submitted,

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APPENDIX 1

(Version With Markings To Show Changes Made In The Specification)

IN THE CLAIMS

Please amend Claims 3, 7, 9, and 10 as follows:

3. (Amended) A fluid conveying tube for vehicle coolers, which on its inside comprises first and second opposite longitudinal primary heat-exchange surfaces, and flow-directing surface structures which are arranged on the primary surfaces and which each comprise a plurality of elongate directing elements projecting from the primary surfaces, the surface structures being alternately arranged on the first and second primary surfaces in such manner that directing elements, succeeding in the longitudinal direction of the primary surfaces, are alternately arranged on the first and second primary surfaces and are mutually inclined at a given angle (γ), wherein each surface structure comprises a laterally extending first row of mutually parallel directing elements, and [A fluid conveying tube as claimed in claim 1, wherein each surface structure comprises] a laterally extending second row of mutually parallel directing elements, the directing elements of the second row being arranged at said angle (γ) relative to the directing elements of the first row.

7. (Amended) A fluid conveying tube as claimed in claim 1, wherein said angle (γ) is about 20-100°[, preferably about 30-90°, and most advantageously about 90°].

9. (Amended) A fluid conveying tube as claimed in claim 1, which is designed to be passed by a liquid, wherein the centre-to-centre distance between directing elements succeeding in said longitudinal direction is about 10-40[, and preferably about 15-35,] times as large as the height of the directing elements perpendicularly to the primary surfaces.

10. (Amended) A fluid conveying tube as claimed in claim 1, which is designed to be passed by a gas, wherein the centre-to-centre distance between directing elements succeeding in said longitudinal direction is about 25-65[, preferably about 30-55,] times as large as the height of the directing elements perpendicularly to the primary surfaces.

Please also add the following new claims 15-20:

--15. A fluid conveying tube as claimed in claim 1, wherein said angle (γ) is about 30-90°.--

--16. A fluid conveying tube as claimed in claim 1, wherein said angle (γ) is about 90°.--

--17. A fluid conveying tube as claimed in claim 1, which is designed to be passed by a liquid, wherein the centre-to-centre distance between directing elements succeeding in said longitudinal direction is about 15-35 times as large as the height of the directing elements perpendicularly to the primary surfaces.--

--18. A fluid conveying tube as claimed in claim 1, which is designed to be passed by a gas, wherein the centre-to-centre distance between directing elements succeeding in said longitudinal direction is about 30-55 times as large as the height of the directing elements perpendicularly to the primary surfaces.--

--19. A fluid conveying tube as claimed in claim 1, wherein said elongate directing elements are arranged obliquely with respect to the longitudinal direction of the primary surfaces.--

--20. A method of effecting heat transfer in a heat exchanger, comprising:
introducing a plurality of partial flows into a heat exchanger tube, the tube defining a longitudinal axis and

imparting to each of said partial flows a swirling motion about the longitudinal axis.--